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HARRY BEAUFOY;

OR

THE PUPIL OF NATURE.

BY

MARIA HACK.

Thus then to man the voice of Nature spake:—
“Go, from the creatures thy instruction take:
Pursue that chain which links th’ immense design,
Joins heav’n and earth, and mortal and Divine.”

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" May not the eagerness of infantine curiosity be directed to a First Cause, powerful, wise, and good, and through the works of Nature, be made to lead to Nature's God? ' As the understanding opens to moral truth, the moral attributes of the Deity will occasionally be suggested, and will be the more readily admitted, and the more deeply revered, from the previous agreeable associations of goodness and power. The truths of natural religion will then pave the way for the truths of revelation.—*Mrs. Hamilton's Letters on Education*, vol. i. p. 140.

PREFACE.

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2: (RECAP)

THOUGH I have purposely avoided placing the formidable words "NATURAL THEOLOGY," in the title-page, yet parents will perceive at a glance, that the admirable work of Dr. Paley has been used as the basis of this little volume. In some places the language of that work is too technical; and in others, the reasoning is either above the comprehension of children, or illustrated by examples unsuitable for them: yet it abounds in passages peculiarly adapted for young people, as soon as their minds become susceptible of religious knowledge. The delighted attention with which I have seen children, from seven to ten years old, listen to such passages, first induced me to bestow some time in selecting a few of the most striking, and arranging them so as to form a chain of argument adapted to the powers of reasoning at that age. In doing this, it has sometimes been necessary to illustrate the arguments of Paley, by examples more familiar to the minds of children than those which he has chosen. This was an undertaking

of some difficulty, and one on which I could scarcely have ventured, but for the kind encouragement of a highly-valued friend, to whom I had the privilege of applying in cases of doubt or difficulty.

When other works of established authority suited my purpose better, I have not confined myself to Paley; neither are the moral and religious lessons which have been deduced from the various natural phenomena referred to, uniformly taken from him. Sometimes they arose spontaneously from the subject, and sometimes I availed myself of such passages in the writings of Dr. Hartley and Bishop Law, as seemed to suit my purpose. Particular references to these works would be useless to children, and parents will probably think this general acknowledgment sufficient.

Chichester.

HARRY BEAUFOY, &c.

CHAPTER I.

~~~~~  
Much design

Is seen in all their motion, and their make :

Design implies intelligence and art.

YOUNG.

~~~~~

HARRY BEAUFOY, a clever, active boy of ten years old, was very busily employed, one summer evening, in weeding and watering his little garden. At length, having finished the work to his satisfaction, he took his rake and watering-pot to the tool-house, and hung them up in their places : he then went to look for his mother.

Mrs. Beaufoy still sat reading in the summer-house, whither Harry had seen her go soon after tea. "I suppose your book is a very entertaining one, mamma," said he ; "but I think even Robinson Crusoe would not have kept me in doors so long this beautiful evening : it is very cool and pleasant now, and I want to shew you my garden before it is dark. I have been weeding and watering, and tying up my pinks ; and it looks so neat that you will like to see it." "I will go with you my dear," replied his mother. So say-

ing, she took a slip of paper off the table, and put it carefully into her book before she closed it. "I am not so particular about marks," said Harry; "I mostly read where I see something entertaining, unless it happens to be a new story, and then I can understand it better if I begin and go straight on; but I can always find my place without a mark." "You must waste some minutes in doing so; and your practice of reading wherever you happen to see an entertaining passage is a childish trick, of which you will probably cure yourself when you really wish to gain knowledge."

"I wish that *now*, mamma. There is a great deal of pleasure in knowing what is entertaining, or even useful, as I found yesterday about your watch."

Mrs. Beaufoy smiled. "So then, the useful is placed *below* the agreeable in your scale; and I believe, at your age, this is very natural: but if so, it is of great consequence that you should early acquire a love for what is excellent, and a taste for order, which will make the acquisition of knowledge pleasant to you; or else there is great danger that your love of being *entertained* will give you the frivolous turn of thought which is the certain consequence of indulging a habit of wandering from object to object, or even from book to book, without any plan beyond the amusement of the passing hour."

"Frivolous; that means trifling, insignificant. Oh! I should be very sorry to be frivolous, for

then every body would despise me. I hope I shall never be *that*. And you see I have a taste for order in some things, mamma. My garden, for instance : look now, if it is not as neat as you could wish it to be !” “I think it does you credit, Harry ; and I am glad to see that you have had patience to allow time for the seeds of your annuals to come up. I expected that the present pleasure of using your new rake would occasion the destruction of your flowers. Now your garden is likely to be as gay as it is neat ; and I hope you will be encouraged to cultivate the love of order and design in other affairs, as well as in gardening.”

“ Well then, mamma, do you not remember yesterday ? When we examined your watch, and compared the different parts of it with the plates and description in Hutton’s Dictionary, did I not go from wheel to pinion, and pinion to wheel, in the very order of the alphabet ? I cannot remember half of what we read ; but I have a distinct idea of the barrel, and the chain, and the fusee. And though the spring was shut up in the barrel, so that we could not see it, I know the shape of it from the drawing ; and I perfectly remember where the two ends of it are fastened, and that it is only the natural effort of the spring to uncurl itself, that turns the barrel round and puts the whole watch into motion. I never thought the inside of a watch half so beautiful or so curious, till I understood why it moved. It is the most ingenious contrivance that ever I saw in my life.”

"You think so, because you are accustomed to see contrivances still more ingenious, without reflecting upon them. When I first opened my watch, you said you could see nothing but a confused assemblage of wheels; and if you had not had patience to begin in the right place, and observe the action of one part of the machine upon another, you would still see nothing but confusion, and have no clearer idea of the contrivance of the artist, or of his skill in adapting one part to another, than you had yesterday morning."

"It was very kind of you, mamma, to take so much pains in explaining the parts of the watch; and it was more amusing to me, because we had a *real* watch to compare with the drawing and the description. I am afraid I should have been tired of pinion *d* and wheel *e*, without that. But I like to understand contrivances, especially when they are so ingenious, and really set things in motion."

While they were thus conversing, Mrs. Beaufoy and her son walked slowly towards the house. "Are you going in, mamma?" said Harry. "Yes, my dear, it is time to go in now; but before you follow me; you may go into the poultry-yard, and open the door of the hen-house as softly as you can. If I am not mistaken, your will there witness the effects of a contrivance, which you will be as much puzzled to understand, as you were to account for the wheels of the watch appearing to move of themselves."

They then separated, and Harry pursued his

way to the hen-house alone. He opened the door with the utmost care and gentleness, expecting some wonderful sight : he put in his head—peeped this way and that—nothing was to be seen but Chanticleer roosting in state, surrounded by his speckled dames. “What could my mother be thinking of!” exclaimed Harry : “she never intended to send me here to look at a parcel of fowls roosting quietly on their perches : a thing that happens every night, and is perfectly natural besides. I suppose some of the servants have taken away the curious contrivance she spoke of, and I shall go and ask her to inquire about it.”

Mrs. Beaufoy was sitting on the sofa, when Harry returned to tell her of his disappointment. “There was nothing to be seen in the hen-house but the fowls at roost ; and I wish you would be so good as to inquire where they have put that curious thing you sent me to examine.”

“You have seen it, Harry, as you see a thousand other things, without being sensible of its ingenuity. We are every where surrounded by the contrivances of an Artist infinitely superior to the watch-maker ; but his works are so various, so delicate, and so perfect : his skill is so constantly and silently employed, that we are apt to overlook things which, if we examined them, would fill us with astonishment.”

“In this case there was nothing to examine, I assure you, mamma. I looked into every corner of the hen-house, and there was nothing to be seen but the sleeping fowls. It must have been taken away.”

"No, Harry ; the fowls were there and asleep : that is what I sent you to see. And now, will you tell me why, when the fowls were asleep, they did not fall off their perches?"

"Because they are birds, mamma ; and you know it is the nature of birds to sleep in that posture."

"But you may have observed that it is the nature of sleep to suspend all bodily power and motion. When your brother fell asleep in my lap yesterday, with the whip he is so fond of in his hand, you saw his little fingers gradually relax their hold, till at length the favourite whip fell upon the carpet. I showed you how limp and powerless his joints and limbs were. But a sleeping bird appears to balance himself with the strength and dexterity of a rope-dancer. How is this to be accounted for?"

"I suppose that sleep does not suspend the bodily powers of birds. They can fly, and we cannot ; so that our nature need not be a rule for theirs."

"They have wings, and we have not ; therefore the difference of our powers in that respect is sufficiently accounted for. But birds and men stand in equal need of sleep to recruit the bodily powers when fatigued by exertion. The *suspension* of those powers is the means of obtaining refreshment ; and the poor bird would be sadly tired in the morning, if any effort of his own was necessary to support his balance during the night. This difficulty has been conquered by the skill of

that wonderful Artist who constructed the machine we call a bird : a machine infinitely more curious and complicated than a watch, and far more worthy of your attentive examination."

"That great Artist is invisible, you know mamma. I cannot see him at work, and I cannot understand his machines, as you call animals ; but I think it is a very strange term applied to living creatures."

"Did you ever see the person who made my watch, Harry ; or even any other watch-maker, at work ?"

"No, mamma."

"Then the invisibility of the artist is no objection to your examining and understanding his works. I suppose you have no doubt of this watch having been made by somebody."

"Certainly not : all those wheels and pinions must have had a maker, and a very clever one too."

"You objected to the word *machine* being applied to living creatures ; but since their power of motion depends upon mechanical contrivances placed in their bodies to answer that purpose, as the wheels and pinions are placed in certain parts of the watch to produce a similar effect, I cannot see any impropriety in calling animals, *machines*. Examine their construction, my dear Harry : observe how nicely every part is adapted to the end in view, and you will then feel a much stronger sense of the goodness, power, and wisdom of the great Artificer who contrived them."

"If I look into the hen-house every night, mamma, I shall understand no more of the matter than I do now."

"Very true my dear. You may there see what will excite your curiosity, but we must take other means to gratify it."

Mrs. Beaufoy then rang the bell, and said to the servant who answered it, "Tell the cook to bring up one of the fowls that hang in the pantry." Harry looked surprised. "Dead fowls cannot go to roost!" said he.

Mrs. Beaufoy smiled. "Then you are of opinion that death destroys voluntary power in birds as well as in men, though you doubt whether it may not be the nature of a bird to balance itself on a perch while it is fast asleep."

"Certainly mamma. Death must destroy voluntary power in every thing."

The cook now made her appearance, with a fowl in a dish, and a countenance expressive of still greater surprise than that of her young master. "Did you please to see this fowl, ma'am: it is quite fresh."

"I believe it is, Betty; but put the dish on the table, and bend up the legs of the fowl as if you were going to truss it."

"Shall I step down and cut the claws off first, ma'am."

"O, no: that would quite spoil our experiment. I wish this fowl to be trussed with its claws on. Stand here, Harry, and observe, carefully observe what happens."

"O, mamma," cried he, "they move, they move!"

"What moves, Harry?"

"The claws of the fowl, mamma; though Betty did not touch them! When she bent up the legs, the claws closed of their own accord, just as if they had grasped the perch. But it is dead—quite dead. I never saw any thing so wonderful!"—

"La, Sir!" said Betty, "it is not wonderful at all: they always does so."

"You may take it down stairs now, Betty: Harry has seen what I wished."

When they were again alone, Mrs. Beaufoy thus resumed the conversation: "Are you of Betty's opinion, that a thing is not wonderful if it happens frequently?"

"Oh no mamma! I am sure it is *very* wonderful for a dead bird to move its feet in that manner. Can you explain it?"

"It certainly could not be owing to any exertion of *voluntary power*; but it may easily be accounted for by a contrivance in the mechanism of the animal. You observed that, when the legs of the fowl were pushed up towards the body, the claws contracted immediately."

"Yes, mamma; but what then?"

"It is exactly what happens when birds go to roost. They assume that posture in order to sleep, and their claws then forcibly contract and grasp the perch. This is not effected by the choice of the bird, but by the tension or pulling

of *tendons*, or cords, placed in its legs for that purpose. The weight of the animal's body gives that force which is necessary for the claws to retain their hold, and thus the creature is enabled to sleep in safety. This remarkable property of the tendons, this uniform posture of the roosting bird, cannot be the effect of chance, but of contrivance ; and when we plainly see a contrivance adapted to any particular purpose, we are *quite sure* that some intelligent person has been employed in designing and perfecting that contrivance. You said, just now, that the wheels and pinions of my watch ' must have had a maker, and a clever one too.' "

" I am perfectly sure of it, mamma. I am not more sure that I am alive."

• Mrs. Beaufoy laid her hand upon Harry's shoulder, and in an earnest, affectionate tone of voice, said, " Listen to me, my beloved child. You have hitherto believed a fact to be true, if I told you that it was so, because you cannot recollect that I have ever deceived you ; and therefore you have no reason to doubt my word. But did it ever occur to you that it is possible I may, in some things, be myself deceived—that I may draw a wrong conclusion from some particular fact, and that on some subjects I must necessarily be ignorant ?

" I never thought about your ignorance, mamma ; though I have often wondered how you can know so many things that I have no notion of till you tell me about them. But I now recollect

that sometimes, when I ask you a question, you say, "I do not know."

"And sometimes I am mistaken, Harry, and suppose I know a thing, which, on further examination, I find to be different from what I had supposed it to be. Now there is one subject, my dear child, on which you ought not to trust me, or any other human being. You ought to be sure of this fact for yourself: so sure, as not to leave the possibility of a mistake."

"Can I be so sure of any thing, mamma? You often tell me not to be positive."

"Very true, Harry. In cases that admit of doubt, it is always right not to be positive; but when you said just now, that you were '*perfectly sure*,' my watch was made by somebody, I did not reprove you; because that is one of the cases in which our knowledge amounts to certainty."

"I understand you, mamma; but what is the subject on which I am not to trust even *you*?"

"It is the existence of that almighty and benevolent Being, who is the first great cause of all that our eyes behold—the contriver, and maker, and preserver of every thing. You believe that there is such a Being, because I have told you so. I also tell you that there are many subjects on which it is possible for me to be ignorant or mistaken, and it is of the greatest consequence to you to be sure that this is not one of them. Hitherto I have treated you as a child, but I now speak to you as a friend; because your mind has

acquired sufficient strength to examine this wonderful truth for yourself. You may, if you please, acquire the certain knowledge that *there is a God, and that he loves and rewards those who endeavour to serve him*. You tell me sometimes that you love God, that you are grateful to him for the blessings you enjoy ; but you have no idea of the love, and gratitude, and reverence you would feel for him, if you could perceive and understand the *proofs* of his goodness, power, and wisdom, which every where surround you. The impression produced on your mind by what I have told you of the Almighty, is very faint, compared to what will be made by your own reflections—your own reasonings—when you come to examine these proofs of his goodness and power for yourself.”

“ But, at my age, can I examine and understand these proofs, mamma ? ”

“ Yes, many of them : and quite as easily as you examined the construction of my watch. You could not distinctly understand the use of every wheel and pinion ; but you clearly perceived the connexion of the barrel, and the chain, and the fusee ; and how they were put into motion by the uncoiling of the spring. You were *quite sure* that an artist had been employed in contriving these things ; and you said that the inside of a watch never appeared so beautiful and curious before. You will experience the same feelings of delight and admiration in a far higher degree, when you examine the contrivances of

the great Creator. It is true that you will not perceive and understand them *all*: the wisest man that ever lived has not been able to do this. But you will see enough to be *certain*, that infinite power and wisdom are continually employed in producing order, and beauty, and happiness. The consciousness of knowing but little, will ~~not make~~ you doubtful of what you do know: it will be clear to you as the uncoiling of the watch-spring."

Harry kissed his mother with unusual affection, and went to bed. "How kindly she talks to me," thought he, as he laid his head on the pillow; "'not as a child, but as a friend.' Yes, those were her own words. I know I should like to be *her* friend! And she says that these wonderful things may be as clear to me as the uncoiling of the watch-spring. She never deceived me and I will do my best to understand them."

CHAPTER II.

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" We trace  
Thro' all the fabric, Wisdom's artful aim  
Disposing every part, and gaining still,  
By means proportion'd, her benignant end."

AKENSIDE.

~~~~~

THE next morning, when Mrs. Beaufoy went into the kitchen to give orders for the day, she desired the cook to cut off a leg of one of the fowls, in the usual place ; taking care not to divide the tendon at the joint, but to draw out the part which runs up that division of the leg which is frequently called the *drumstick*. With this in her hand, she returned to the parlour, where she found Harry waiting for her as usual. " Oh mamma, what are you going to do with that leg of the fowl ?" " To show you, my dear, that the curious mechanism of which we were speaking last night, is not a matter of opinion, in which it is right we should be diffident ; but a *fact*, of which we may be certain from the evidence of our senses. Here, take this into your own hand, and examine it. I have had a piece of the tendon left, on purpose that you might see the manner of its operation."

Harry then began to pull the tendon, and saw that, every time he stretched it, the claws contracted as they had done the evening before. " I

could not see the tendon last night, mamma : it was hidden by the skin of the fowl, and the shutting of the claws seemed like magic. But now the reason is quite plain : I see it is as much the consequence of stretching the tendon, as that the bell should ring when I pull the handle. I wish, dear mamma, you would explain some more of those wonderful contrivances you were speaking of. If they are all as clear and plain as this," added he, holding up the claw, and pulling the tendon with great rapidity, "I am not at all afraid but I shall be able to understand them."

"I told you last night, my dear boy, that you cannot understand them *all*; and even of those which may be rendered as evident to your senses as that with which you are now so much pleased, the number is so astonishing, that the labour of a long life would not be sufficient to examine for yourself their infinite variety. I am, however, very willing to assist you, as far as I can, in selecting some of the most striking proofs of contrivance, choice, and design, in the works of the great Creator."

"Then I will tell you what I wish to know more than any thing else. Last night you called animals *machines*; and you said that their power of motion depended upon mechanical contrivances. I see you were right about the claw of the fowl; but I cannot think that this has any thing to do with human beings. We cannot be machines, because we have the power of thinking, and because our motions depend upon our own choice."

"This is quite new doctrine to me, Harry ; pray where did you learn it ?"

"I am sure I do not know. I never thought about it till this morning ; but it seems to me one of those very plain things that nobody need to learn, because we know it without learning."

"You speak very positively ; pray is this a matter of fact, or a matter of opinion ?"

"Of fact, mamma, certainly ; plain, positive fact. Can any thing be plainer than that when we wish to move, we move. When *we* go to sleep, we are obliged to put ourselves into a safe situation ; *our* limbs do not catch hold of any thing to support us. Little Alfred's whip, you know, dropped out of his hand, because it had no power when he was asleep. Oh, I am sure that we are very different from birds : the actions of men depend upon their own choice, and nothing else."

"Why do you not *fly* sometimes, Harry ? I should think it would make a pleasant variety in your amusements."

"Oh, ~~now~~ you are joking, mamma ! I do not mean that we can do *unnatural* things."

"I am afraid that you do not understand your own meaning very clearly. The action of flying is unnatural to man, only because the human machine is so constructed as to be incapable of that kind of motion."

Harry now looked rather bewildered, and his mother kindly resolved not to leave his mind in this state of confusion.

"In how many ways have you the power of moving your head," said she.

The young reasoner, who had involved himself in a terrible dilemma, was quite relieved by this apparently easy question, and replied, hastily : "Oh, I move it just as I please : only look how fast it goes, any way and every way."

"I can see only *two* motions in all that nodding and shaking ; one backwards and forwards, the other describing part of a circle. You will make your head ache to no purpose, if you jerk it about in that manner : those two motions are all that it has the power of making, and to effect even these, two distinct mechanical contrivances were necessary."

"Contrivance, mamma ! I see no contrivance in the matter. I assure you, the motion of my head depends entirely on my own choice."

"Indeed ! then yours is a very remarkable head. To convince me of the truth of your assertion, be so good as to sit perfectly still for one minute. Now, Harry, without moving your body, look at that fly on the wall behind you."

"I cannot see it, mamma."

"That is because you do not look far enough round : the fly is exactly behind you."

"But my head will not turn any further, unless I move my body too."

"If you do, it will be the body that turns, not the head ; therefore, its power of motion is regulated by something independent of your choice."

"I should like to know what that something is. Can you explain it, mamma?"

"I suppose you would not wish me to illustrate this point exactly in the same manner that I showed you the reason of the fowl's claw contracting on the perch ; but, with the assistance of some good anatomical figures, I think I can make it sufficiently intelligible to you. Go and fetch me the plates belonging to Chambers's Dictionary."

By the help of one of these plates, Mrs. Beaufoy showed Harry that the head rests immediately on the uppermost part of the back-bone. She told him that this is not, as at first sight it appears to be, a single bone, supporting the head like a pillar ; but that it is, in reality, a *chain of joints*, of very wonderful construction, and capable of answering a variety of purposes, which could not possibly have been effected by a single bone. That, indeed, might have supported the head ; but then we should have been under the irksome necessity of sitting, standing, and walking bolt upright all our lives, without the power of stooping, or of looking either to the right hand or to the left.

Harry said that he saw the use of a jointed back-bone in stooping, but he could not understand how the head moved from side to side.

Mrs. Beaufoy then showed him the figures which represent the two uppermost joints of the neck. The first of these bones is called the *Atlas* : the head rests immediately upon it, and is

united to it by a *hinge*-joint. Upon this joint the head plays freely backward and forward, and Harry's mother told him that he was indebted to this *hinge* for the power of nodding, and of looking either up or down. "A hinge," added she, "can only open and shut: it will not move in any other direction. We must look a little further for the cause of that power which the head possesses, of turning from side to side." She then made him observe the figure of the *second* joint of the neck, and pointed out the projecting bone shaped like a tooth, which rises from its upper surface. She told him that this tooth enters a corresponding hole in the *Atlas*, or joint immediately above it; thus forming a pivot upon which that upper bone, together with the head that it supports, turns freely in a circle, at least so far in the circle as the muscles of the neck will permit. "You know," said she, "that you could not turn your head so far round as to see the fly when it was just behind you. I told you that the first or uppermost joint is called the *Atlas*: the second is termed the *axis*. Can you discover any reason for these names?"

"The meaning of the second is very plain," said Harry, "for that projecting tooth just answers the same purpose as the axle-tree of a wheel. I cannot think of any reason for the other," added he, after a pause, "unless it comes from the old fable of Atlas supporting the heavens."

"That probably may be the origin of the term,

Harry ; and I think you are now in no danger of forgetting the names and uses of these two joints."

"I understand the explanation you have given me, perfectly, mamma. Now, when I nod to you, I use the *hinge*-joint ; and now," added he, turning his head very sagaciously from side to side, "I am using the *axis*."

"Perfectly right : we need then say no more respecting the motion of the head. But there are some other uses and properties of this curious back-bone, or *spine*, which, perhaps, I can explain to you. In the first place, it was necessary it should be *firm*, in order to support the erect position of the body ; in the next, it must be *flexible*, or capable of bending with ease. It is, therefore, composed of twenty-four bones, joined to each other by broad bases. The breadth of these bones, and the closeness with which they are united, give *strength* to the spine : the number of the joints render it *flexible*. These joints are called *vertebræ*, from their remarkable power of bending and turning ; *vertebra* being the Latin word for a turning joint. It is remarkable that this flexibility, or power of bending, varies in different parts of the spine. It is least in the back, where strength is most wanted ; greater in the loins, which was necessary for the power of stooping or lifting ; and greatest of all in the neck, to provide for the free motion of the head."

Harry, after various wriggings and contortions of his whole person, declared himself satisfied

that there were three degrees of flexibility in the spine, and that his mother had described them correctly. "But, mamma," said he, "surely *three* joints would have been sufficient for the purpose : what use can there be for so many ?"

"I will tell you, Harry. That wonderful chain of joints called the spine, answers another important purpose, distinct from those I have mentioned. Each of the vertebræ is bored through the middle, in such a manner, that when the joints are put together, the hole in one bone exactly corresponds with the holes in the two bones which are joined to it. Therefore, while the spine is upright and at rest, these holes form a close-continued channel from one end of the spine to the other. This channel becomes a pipe for the safe conveyance of the *spinal marrow*; which is of the utmost importance, because upon it the power of voluntary motion depends."

"I do not understand what you mean by voluntary motion."

"That which depends upon will, or choice. I used it in opposition to mechanical power, over which we have not the same control; and therefore, the wise Contriver of our frame has made use of it to restrain the exercise of voluntary power within just bounds. Of this arrangement you just now experienced the benefit."

"I, mamma, how?" exclaimed Harry.

"When you thought that the motion of your head entirely depended on your own choice, you tried to turn it quite round : had you succeeded,

you would probably have bruised and injured the delicate substance called the spinal marrow, and must, in that case, have suffered the melancholy consequences of such an accident; but this mischief was prevented by the *mechanical* power of the muscles and ligaments of the neck, which hindered you from turning your head further than it might be turned with safety. Now, Harry, is not such an arrangement—such a check of mechanical power over voluntary power, a proof, not only of wisdom in the contriver, but of benevolence?"

"Certainly; nobody can doubt that; but if I had injured the spinal marrow, what would have been the consequence?"

"I cannot exactly tell, as it would have depended on the extent of the injury; but any unusual pressure upon the spinal marrow, or any considerable obstruction of its course, is followed by *palsy*, which is a loss of power and feeling in part of the body. If the injury be still greater, it is followed by death."

"Then, if you had not known that the mechanical power of the muscles would prevent my injuring myself, I am sure you would not have desired me to turn my head quite round."

"Certainly not," replied his mother: "and now that you are aware of the delicate nature of the spinal marrow, you may perceive the advantage we derive from the back-bone being composed of so many joints: if it consisted of three pieces only, which you thought would be suffi-

cient for the three degrees of flexibility, the body would have made so great a bend at each joint, that the spinal marrow must have been bruised at every angle ; but now, the curve being formed by a great number of joints, the motion of each is so small, that this important substance is in no danger of being injured by any common action of the body."

"I have thought of another difficulty, mamma. You say that the spinal marrow is the cause of voluntary motion ; but how can a power that exists in every part of the body, depend upon a substance shut up in the centre of the backbone?"

"If it were *shut up* there, this would indeed be impossible. To remove your difficulty, I must tell you of another curious peculiarity in the construction of the spine. There are two notches on the upper and lower edges of each of the vertebræ ; when the vertebræ are put together, these notches exactly fitting to each other, form small holes. Through these holes, the nerves, which are soft, white, fibrous cords, arising from the brain, and the spinal marrow come out in pairs, and are distributed through the body. The nerves not only convey the excitement to voluntary motion, but are themselves the organs of feeling : the other parts of the body are insensible, and appear capable of feeling only from the nervous fibres that are distributed among them."

"How is it possible for this to be known?"

"The accidents to which the human machine is liable, throw considerable light upon its structure. For instance, the spine is sometimes injured in such a degree as not to occasion death, though it causes the loss of feeling, and of the power of motion, in every part of the body which receives nerves from the spinal marrow that is situated below the wound."

"Why should the loss of feeling be confined to the parts *below* the injury?"

"Because the injury cuts off their communication with the brain. This gives us reason to believe that the brain is the original cause of sensation and consequently the source of our ideas, or the seat of the intelligent principle which we call the mind; and that the spinal marrow and the nerves are the organs of communication, by which the mind exercises its power over the motions of the body."

"This is most wonderful."

"It is indeed, Harry; and I will leave you to reflect upon it, without confusing the ideas you have now gained, by attempting to explain any other part of the machinery of the human frame at present."

THE attention of Mr. Beaufoy had for some time been silently divided between his breakfast and the newspaper; at length he met with a paragraph which he read aloud. It was an account of a melancholy accident which had happened to a stage-coach. It had been overturned;

one of the outside passengers was killed ; and, among other casualties, it was said that a gentleman, who was sitting by the coachman, had *dislocated* his shoulder in the fall.

Harry did not recollect having heard this word before. "Pray, mamma," said he, "what is the meaning of *dislocated*?"

"To *dislocate* is to put out of proper place. When this word is applied to any part of our bodies, it means that a bone is pressed out of its socket, or, in the common phrase, *put out of joint*."

I do not understand this : I thought you said that our joints could only open and shut like hinges. I know that a hinge may be *broken*, but I do not see how it can be pushed out of its place."

"There are two kinds of joints in our bodies," replied his mother, "though I had occasion yesterday to speak of only one of them, the *hinge-joint*, which attaches the head to the back-bone. The other kind is called the *ball and socket joint*. The upper part of the arm-bone terminates in a round knob, or ball, which fits into a socket, or cup, in the shoulder. If by any accident this ball slips out of the socket, the shoulder is said to be *dislocated*; though perhaps it would be more correct to say, that the arm is dislocated at the shoulder, since the arm-bone is that which is put out of its place."

"I like the hinge-joint best, because it seems less liable to injury."

"I believe you would be very sorry, Harry, if the ball and socket in your shoulder were exchanged for a hinge-joint. In that case you must give up the pleasure of skipping, of driving your hoop, and every other exercise which requires a circular motion of the arm."

"I am sure I should not like that : but it is a sad thing that these balls and sockets are so apt to slip out of their places. How I pity this poor gentleman!"

"*So apt*, Harry," said Mr. Beaufoy, looking up from his newspaper with an ironical smile : "Why, my good fellow, is not this the very first accident of the kind you ever heard of? I, who have lived so much longer, can recollect only *two* persons of my acquaintance to whom this misfortune, which is "*so apt*" to happen, has occurred."

"Ah, papa ! when the wrong word just comes by chance, you are sure to find it out, and laugh at the blunder. But I am glad to hear that these balls and sockets are not so slippery as I supposed : it must be very shocking for them to be pushed out of their places."

"Perhaps not quite so shocking as you suppose," replied his father : "when the shoulder is dislocated, the application of a proper degree of force generally restores the arm to its place without much difficulty. I once heard a gentleman to whom this accident had happened, give an account of it, and I observed that his imagination appeared more strongly impressed by the recol-

lection of the *delight* he experienced, when the bone of his arm had risen over the edge of the socket, and slipping into its place, suddenly restored him to ease and comfort, than by the pain he had previously endured. I believe this gentleman has a much more lively conception of the pleasure of having his arm in the right place, than either you or I can possibly feel; so that you see he is, on the whole, a gainer by the accident."

"But still he paid dearly for that pleasure, and I am sure I do not envy him."

"As you seem to have so formidable an idea of the inconveniences of dislocation," continued Mr. Beaufoy, "I think you will be glad to hear that, in some important joints, this danger is guarded against by an additional security, consisting of a short, strong, flexible ligament, fastened by one end to the head of the ball, by the other into the bottom of the cup. This ligament keeps the joint so firmly in its place, that nothing but the greatest and most unnatural violence can pull the ball from its socket. You would be astonished to see how great a force is necessary even to stretch, and still more to break this ligament; which is kindly and wisely placed for the protection of a joint, that, if dislocated, would be restored to its place with much greater difficulty than that of the shoulder. If you remind me of it the next time we have a leg of mutton, I will show you the ligament I have been describing."

"A leg of mutton, papa! I thought you were speaking of the formation of *our* joints."

"So I was; but in many parts of our frame we resemble various other animals; and it will be easier, and more agreeable, to show you this contrivance at the head of the thigh-bone in a leg of mutton, than it would be to take you to a surgeon's dissecting room."

"A dissecting room," said Harry, with a look of disgust: "I have no wish to go there, I assure you."

"I hope you are not so absurd as to connect unpleasant ideas with the noble and benevolent art of surgery; if so, you are more childish than I had supposed."

"Do you not think, my dear," said Mrs. Beaufoy, "that it is natural to feel some disgust at the actual sight of such objects, till habit has rendered them familiar?"

Mr. Beaufoy, who had a secret idea of educating Harry for some branch of the medical profession, eluded the question, by saying, with a smile, "I believe it is perfectly natural for a kind mother to make an ingenious apology for her son; and I am glad, Harry, that you have one who is also wise enough to assist you in shaking off these foolish prejudices. You perceive, my dear," added he, turning to his wife, "that I have heard the subject of your conversation yesterday. I quite approve your plan of conveying a general idea of the structure of the human frame, by the help of anatomical prints. There is no machine

so curious, or so worthy of attentive examination."

"I told papa all about the *Atlas*, and the *axis*, and the spinal marrow, when we were walking before breakfast."

"And you explained your meaning very well," said his father. "Next time we walk together, I hope you will tell me something more. Now I must make use of one of my hinge joints, to wish you both good morning," added he, nodding good humouredly, "and put my balls and sockets in motion ; for it is high time that I should be somewhere else."

When the covers were removed at dinner-time, the bottom dish proved to be a quarter of lamb. Harry observed his father slip his knife under the shoulder, and separate it from the ribs, with no greater effort than was necessary for cutting through the flesh. "Poor thing," said Harry, "I suppose it had by some accident dislocated its shoulder, for it comes off with less difficulty than the leg of a fowl."

"Take care, my little philosopher, not to push resemblances further than they will bear," replied Mr. Beaufoy. "The existence of a corresponding ligament in the thigh-joint of a man and of a sheep, does not prove that their shoulders bears the same resemblance. Most quadrupeds have no collar-bones ; and in those which have not, the shoulder-blade has no bony communication with the trunk, but is, as you see,

merely bedded in the flesh, attached by muscles only to the body of the animal. Therefore, I can cut off the whole fore-leg without interfering with any bone or joint. After dinner, I will show you that the shoulder of a man is differently circumstanced."

Soon after the table was cleared Harry, by his father's desire, fetched the plates belonging to Chambers's Dictionary; and there he saw that the human shoulder is formed by two bones, the collar-bone and the shoulder-blade. His own light, active body had no superfluity of flesh; and he could distinctly feel the shape of his collar-bone, from its union with the breast-bone to its junction with the shoulder, which it supports, and prevents from falling forward on the breast. Harry was very fond of what he called *real proofs*, by which he meant the comparison of drawings or descriptions with the objects represented or described; and his father and mother encouraged this taste, because they thought it gave distinctness to his ideas, while it strengthened his powers of observation. On the present occasion it also accorded with Mr. Beaufoy's views respecting him.

The anatomical plates revived the ideas of the morning in Harry's recollection. "You said, papa, that it would be more difficult to restore the thigh-bone to its place, than that of the arm; what is the reason of this?"

"They are both ball and socket joints," replied his father; "but there is a difference in

their form and proportion, admirably suited to the different offices each has to perform. The cup, or socket, at the shoulder, is much shallower than that of the hip-joint ; and the rim of this cup is formed of *cartilage*, or gristle, which, you know, is a smooth, solid body, harder than a ligament, but softer than a bone. Cartilage also possesses a natural elasticity, or disposition to yield to pressure, and to recover its form when the pressure is withdrawn.

“ The construction of the cup of the shoulder, which is scarcely deeper than the corresponding part of the play-thing you call a *cup and ball*, must necessarily render it easy for any violent jerk, or strain, to displace the bone of the arm ; but when such an accident has occurred, it also affords greater facility for returning the ball to the socket.”

“ But, surely, it would be still better if the socket were deep enough to prevent such accidents.”

“ That is a very partial view of the question, Harry. The shallowness of the socket, and the yielding nature of the cartilage that surrounds it, are also of great use in allowing that free motion of the arm, which is necessary for a variety of operations. Compare the extent and freedom of this motion, with that possessed by the hip-joint.”

“ I can certainly throw my arm about in a manner that my leg has no power to imitate. Indeed,” added Harry, “ I think it would be of

no use to me to flourish my leg round in this way ; but when I run, papa, the hip-joint moves as quickly and freely as I can desire."

"As the lower limbs support the weight of the body," resumed Mr. Beaufoy, "it was especially necessary that firmness, as well as action, should be consulted in their structure. The legs can move, in all directions, like the arms, though they cannot use this power to the same extent ; for, to the power of motion, it was necessary to unite strength, and a greater degree of resistance to dislocation. This is provided for in two ways : by the tough ligament which ties the ball to the socket, and by the greater depth of the cup, which has also a smaller proportion of cartilage upon the edge."

"From what your father has just told you," said Mrs. Beaufoy, "you must perceive, that though it is much easier for the shoulder to be dislocated than the hip, yet that it may be slipped back over the yielding cartilage into its shallow socket, with much less pain and difficulty than the thigh-bone could be restored to its place. Can you have a more striking proof of the benevolence and wisdom of the Artist, who has so carefully proportioned the probability of the accident to the means of repairing it, and has guarded against the greater danger by additional precautions ? If 'we are fearfully and wonderfully,' surely we have also reason to say that we are *mercifully* made !"

Harry Beaufoy, though a very active, manly boy of his age, had never yet learned to play at cricket. One evening, after tea, his father produced a new bat, and a hard, smooth, red ball; increasing Harry's delight by adding to these welcome gifts, the offer of going into an adjoining field, and teaching him how to play. The game was kept up, with great spirit, till it was nearly dark; and Harry went to bed completely tired.

In the morning, Mrs. Beaufoy was surprised that Harry did not rap as usual at her chamber-door; and before she had quite finished dressing, she went to his room. "Are you awake, my dear?" said she, opening the door. "Yes mamma,—" answered Harry; but in a tone so disconsolate, that his mother, hastily advancing to the bed-side, said, "What is the matter, my dear?" "I do not know, mamma; but when I try to lift up my head, or to move my arm, it brings such a very great pain, that I am afraid I cannot dress myself."

"Whereabouts is this terrible pain?" said his mother. Harry passed his left hand over his right shoulder and the back of his neck. "It is trifling now, mamma: it is moving that makes it so painful." The recollection of the preceding evening's amusement now occurred to Mrs. Beaufoy, and dispelled her anxiety: "You are only stiff with playing at cricket," said she cheer-

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fully ; " lie still, my dear, till I have finished dressing, and then I will come back and help you."

Harry obeyed ; and his mother soon returned with something in a bottle, with which she bathed his neck and shoulder, rubbing it for a considerable time. She then assisted him in putting on his clothes, for he appeared to have very little power of moving his arm. In the mean time he exerted all his eloquence to convince her, that his stiffness could not possibly arise from playing at cricket ; because, playing at trap-ball did not hurt him, and he was sure that the circumstance of having *no trap*, could not produce any effect upon his shoulder. " You did not play with the same bat, Harry," replied his mother, who retained her own opinion, in spite of her son's rhetoric : " but we have no time to discuss the point now, for your father will want his breakfast."

While they were descending the stairs, the parlour-bell rang loudly, and as they entered the room, where " the bubbling and loud hissing urn" had for some minutes been throwing " up its steamy column" in vain, a well-known voice exclaimed : " Go and call Mrs. Beaufoy directly."

" Mrs. Beaufoy is very sorry to have kept you waiting," said she, in a conciliating tone, " but—"

" Oh, never mind '*but*,' I am glad you are here at last. Come, jump about Harry :—set a chair for your mother ;—fetch the tea and sugar."

Poor Harry attempted, in the first place, to draw a chair to the table ; but his motions were

so slow and awkward, that his father said : "What are you doing ? You seem to be half asleep. Pray move as if you were alive."

Observing Harry's reluctance to own his helpless state, Mrs. Beaufoy said : "Harry is very stiff in consequence of his exertion last night ; but he does not like to acknowledge that so delightful a game can have any unpleasant consequences."

"Oh, is that all !" said his father : "then we will have another game to-night, and play off the stiffness." Harry's countenance brightened ; for he had been very much afraid that cricket would be prohibited in future, because his mother ascribed his stiffness to that cause, and he began to eat his breakfast with great satisfaction. Presently, however, having occasion to hand his empty cup to his mother, his shoulder gave him so severe a twinge, that he set the cup down hastily, and rising from his chair, made use of his left hand to push the cup across the table. His father observed the action, and smiled, saying, "I see we must put off our game till to-morrow : you will not hit the wicket to-night."

"Oh, my shoulder is a great deal better since mamma bathed it. I dare say it will be quite well in the evening. But papa, do you really think that playing at cricket can have any more effect on the shoulder than playing at trap-ball ?"

"Not if you played with the same bat ; but that which I gave you last night is longer and heavier than your old one : it requires much more

strength to use it, and no doubt, your mother is perfectly right in thinking that this unusual exertion of the muscles has produced the stiffness that incommodes you."

"The *muscles*, papa, I do not understand you. I thought this ball-and-socket joint was in fault. Indeed, when I first waked, and found that I could not move my arm, I thought it had slipped out of its place."

Mr. Beaufoy laughed heartily at this, and then said, with mock gravity, "I cannot be surprised at your thinking so, as these slippery joints are '*so apt*' to be out of order. No wonder that your shoulder should be dislocated by turning in your bed."

"Harry was not a good judge of probabilities at the moment of waking; especially when he felt a pain he could not account for," said his mother.

"You have an excellent advocate there, behind the tea-urn; but, my dear boy, you must learn to use your reason, and not fancy impossibilities, even though you happen to be just awake."

"You must recollect, my dear," resumed Mrs. Beaufoy, "that Harry knows nothing of the mechanism of the shoulder, except its bony construction. If you will be so kind as to explain the powers of the muscles to him, he will be prepared to make use of his reason another time."

Thus called upon, Mr. Beaufoy readily undertook the task proposed, and reminded his son of

the conversation he had had some days before with his mother ; when she had informed him that the nerves, which proceed from the brain and the spinal marrow, are the organs of sensation, and also the means of exciting the muscles to action : thus forming the communication between the mind, or intelligent principle, and the mechanism of the body. "Yesterday evening," continued he, "your desire to strike the ball was instantly followed by the contraction of certain muscles connecting the arm and shoulder. The power supplied by the nerves distributed on those muscles, occasioned that contraction ; and the result of the whole was a quick and forcible motion of the arm, fitted to produce the effect you intended. Again, your nerves are now informing your mind, in very intelligible language, that she has imposed too hard a service upon the muscles, and I hope she possesses sufficient prudence to be more reasonable in her requisitions another time."

"I thought, papa," said Harry, laughing, "that we were to cure the stiffness by another game at cricket."

"Certainly : we must, however, wait till the muscles recover their power of action. But I wish to know whether you understand the communication between mind, nerve, muscle, and limb, which I have been attempting to describe."

"I do not understand *how* the mind acts upon the nerves, but only that there is some communication between them : then the nerves act upon

the muscles, and the muscles, you say, have the power of moving the limbs. But I do not know what these muscles are, nor whereabouts to look for them."

"Then I will tell you," replied his father. "The muscles constitute that part of the human body which we call flesh : they are bundles of red fibres. Many of the large muscles consist of two distinct parts ; the belly, or swelling part in the centre, and the shining tendons at the ends, by which it is attached to the neighbouring parts. I cannot think of a better example of a muscle, than that which you must often have seen at the knuckle of a leg of mutton."

"I remember it perfectly, papa : it is very good to eat. And I know that the shape of that piece of flesh is just what you describe, swelling and bulging in the centre, and ending in two skinny, shining tendons."

"Since you have a distinct idea of the form of a muscle, I think you may understand how it acts. Muscles possess the power of contracting or shortening themselves in the fleshy, central part : this necessarily draws the tendons at the ends tighter : and the tendons, when pulled, occasion motion in the parts attached to them."

"I understand that very well," said Harry : "I saw it in the claw of the fowl."

"Then you are the better prepared for what I am going to say. Whatever motion any joint is capable of performing, that motion, the muscles attached to it have the power of producing.

For instance, the joint at the knuckle of a leg or a shoulder of mutton is a *hinge*-joint. The muscle you remember to have seen lies along the bone, one tendon being attached to the part *above* the joint, the other to the part *below* it ; therefore, as this muscle is lengthened or contracted, the joint must shut or open ; the only motions of which hinge-joints are capable. The same structure is observed in our elbows and knees, which are also *hinge*-joints, capable of moving only in one direction ; and it is a proof of *design*, that these joints are not furnished with any muscles, but such as are necessary for producing that particular motion."

" But the shoulder is a ball-and-socket joint, papa ; how are the motions belonging to it produced ?"

" Those motions are provided for by appropriate muscles. I believe our old friend Chambers will enable me to show you one or two of the most remarkable."

Harry ran to fetch the book, and on first looking at the plates representing muscular action, was immediately struck with the resemblance of form between many of the great muscles, and his acquaintance at the knuckle of a leg of mutton. His father then pointed out to him the muscle called *Deltoides*, in the back view of the shoulder, the point of which it covers like a triangular cap. He told Harry that the use of this muscle is to lift up the bone of the arm, into the middle of which one of its tendinous extremities is insert-

ed. He added, that the muscle derives its name from its resemblance to the shape of the Greek letter Δ *delta*.

"I can never forget that, papa," exclaimed Harry: "*Delta* is so familiar to me, because of the *Delta* of the Nile!"

Mr. Beaufoy then pointed to another muscle, which joins one side of the *Deltoides*, and covers the upper part of the shoulder-blade. He added, that this bone is drawn in different directions, in consequence of the different disposition of the fibres of the muscle in question. "And here," continued he, "in the front of the arm, are placed the muscles which bend the elbow." As he spoke, he gently pressed the front of his son's arm. Harry started.

"Oh, papa, my arm is very tender just there!"

"Tender! what should make it so?" said Mr. Beaufoy, ironically.

"Ah, papa, you know the reason very well. These muscles, that you have been showing me, which are employed in bending and raising the arms, are the very parts that are so tender and painful; and I am quite convinced now, that mamma was in the right."

"You are an honest, candid little fellow," replied his father, with an approving smile: "I trust your muscles will soon recover their tone, and that we shall enjoy many a good game of cricket together."

"Thank you papa; but before you go will you answer one more question? You said that muscles

and flesh were the same thing ; but how can I, who have hardly any flesh on my bones, have the same muscles as you ?”

“ You may have the same *number* of muscles, though inferior in strength and size. Your muscular parts are yet unfilled ; when they have attained their proper growth and firmness, you may play at cricket without sustaining any inconvenience, unless you should be indolent, and lose the power of pleasurable exertion for want of making use of it.”

“ I do not intend to do that, I promise you : and, after all, papa, I am not sorry for this stiffness. It will soon be well, and I have enjoyed a great deal of pleasure while you were explaining the action of the muscles.”

CHAPTER III.

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“ Show him in an insect or a flower,  
Such microscopic proof of skill and power,  
As, hid from ages past, God now displays,  
To combat Atheists with in modern days.”

COWPER.

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MR. BEAUFOY had lately purchased an excellent microscope, and he promised Harry, that the first time he was at leisure, he would show him some of those wonders which are invisible to the naked

eye. One morning he came into the parlour with a tumbler of water in his hand, in which the quick eye of Harry detected some little, moving objects. "Oh, papa," exclaimed he, "do not think that water : there is something alive in it!" "I know it ; and I have brought these little creatures here on purpose to show them to you. They are young tadpoles ; and when we have done with them, you may carry them to the pond in the next field, where they may grow into frogs, at their leisure." So saying, Mr. Beaufoy set down the tumbler, and, unlocking the case of the microscope, began to prepare it for use.

"I can see these tadpoles without the help of the microscope," said Harry : "I thought the use of that was to show us things which are too small to be examined by the naked eye."

"You thought rightly, Harry. There is, however, some difference between seeing a thing and examining it. Your unassisted sight cannot discern all that is worth looking at in a tadpole."

"They seem to be very active little things ; but they are not pretty. I think I could find much more beautiful objects for your microscope," replied Harry, who continued to amuse himself by watching the motions of the tadpoles, notwithstanding their want of beauty, till his father interrupted him by saying, "Come here, Harry, and look through the instrument. I have now placed one of these creatures in a proper situation : tell me if it resembles those in the tumbler."

Harry had never till now looked through a microscope, and he was rather embarrassed by his own long eye-lashes. "Do you see any thing?" said his father, wondering that he made no remark.

"Yes, papa, I see a bright light; but something keeps coming across it, like the leg of a great, black spider."

"A black spider! there is not the smallest resemblance. What can the boy be thinking of!"

Mrs. Beaufoy, who guessed the cause of his perplexity, now laid down her work, and came to the table. She desired Harry to close one eye, and gently to touch the instrument with his hand so that he might obtain a resting-place for his cheek. "Your head keeps waving about," added she, "and your eye-lashes brush against the glass, and prevent you from distinguishing the object."

An eager exclamation of delight soon proved that this hint had been of service. "Well Harry," said she, "what do you see now?"

"Oh, something very beautiful; but not at all like the tadpole!"

"What is it like, then?"

"It is more like a multitude of little beads, swimming along in all directions, than any thing else."

"Those 'little beads' are the globules or minute particles of the tadpole's blood; and the motion that you observe, is occasioned by the action of the little creature's heart, which produces what

is called *the circulation of the blood*; a wonderful contrivance, and perhaps better understood than any other part of animal organization. The communication between the will and the muscles, by means of the nerves, may be more astonishing; but we do not know so much about it."

"Does the motion of these little globules resemble the circulation of the blood in larger animals?"

"Most certainly; but I could not *show* you that motion so conveniently in them. While tadpoles are very young, they are so transparent, that we are able to look within them, and see how this wonderful operation is carried on. Some persons are cruel enough to open a full-grown living frog, and submit its internal structure to this kind of examination. I have heard it described as a most beautiful and curious sight; but it is one that I could not enjoy, if a poor animal must expire in torture to procure me the gratification."

Harry, with honest indignation, expressed the disgust he felt at the cruelty of such an experiment. "But you have not hurt the poor little tadpole," said he, as Mr. Beaufoy released it from the glass tube, and restored it to comparative liberty, amongst its companions in the tumbler.

"No, my dear," replied his father: "I should think it wrong to inflict suffering on any creature, for my own amusement or for yours. When Dr. Harvey was pursuing his great discovery, it might be necessary for him to try many experiments on

animals—probably many painful ones ; but when a truth is well established, and may be believed on the testimony of credible witnesses, I think no humane person would desire to repeat such experiments, merely for the sake of seeing these things with his own eyes.”

“I am quite of your opinion, papa : no poor creature shall be tormented for me. But who was this Dr. Harvey, and what was the great discovery you mentioned ?”

“Dr. Harvey was an English physician, who lived in the reign of Charles the First. His industry and sagacity were rewarded by discovering the manner in which the heart impels the blood through the arteries of animals, and receives it back again from the veins.”

“Why then the blood must run through the heart. This is wonderful ! How could he find it out ? Pray, papa, tell me something more about Dr. Harvey and his discovery.”

“Perhaps, when you are older, you may read the life of this great man, and his account of the experiments by which he convinced himself of this fact. I will now only tell you that he completely succeeded in establishing the truth of his opinion ; and that a great change in the practice of medicine was the consequence of so wonderful an accession to human knowledge. Dr. Harvey dedicated his account of this discovery to king Charles, to whom he was afterwards appointed physician. He seems to have been attached to his royal master, and shared his dan-

gers at the battle of Edge-hill. You know the melancholy fate to which tyranny and duplicity at length led this unfortunate king : his example deserves to be recorded as a warning to others ; but the name of his physician will descend to future ages, in the honourable list of the benefactors of mankind."

"Then Dr. Harvey will have more real glory than king Charles. I am sorry I must wait till I am older, to know more about him."

"You will enjoy reading the account of his experiments much more, when you are capable of thoroughly understanding them ; but the result of his discovery, so far as it respects the disposition of the blood-vessels and the construction of the heart, perhaps I can in some degree explain to you."

"Oh, thank you ; you are very kind, papa !" said Harry : then leaning both his elbows on the table, and supporting his chin on his hands, he fixed his eyes on Mr. Beaufoy's face, with an expression of earnest attention.

"I believe I ought first to tell you, that one great purpose of the circulation of the blood, is to convey nourishment to every part of the body. The grosser parts of our food pass off by their appointed channels : those which contribute to our future support, after undergoing the necessary operations in the stomach and other organs, are at length converted into blood. Thus your dinner finds its way even to the ends of your fingers."

"I am sure I had no idea of my dinner taking such a journey," said Harry ; "and I should like to understand how it is managed."

"It is better to explain one thing at a time, Harry. I shall not now meddle with your dinner, till after it is converted into blood, because my present object is to make you understand the manner in which that fluid circulates. You just now saw the blood flowing in the veins and arteries of the tadpole : the same process, though unseen, is continually going on in our own bodies. The manner in which the blood-vessels are disposed, bears some resemblance to the arrangement of the pipes by which a great city is supplied with water. You have heard that London is supplied by means of an engine contrived for the purpose of distributing the water of the New River through the city. Large trunks are carried from this machine, in different directions ; smaller pipes branch out from these trunks into streets, lanes, and alleys ; still smaller ones issue from them, and convey the water into private houses ; but it is impelled through them all by the action of the principal engine. So far the resemblance is complete : these water-pipes represent the arteries which carry the blood from the heart to the extremities of the body ; but in the human frame another contrivance was necessary. The good citizens of London may use the water, or waste it, as they please ; but the precious fluid, conveyed by the arteries to the ends of the fin-

gers, must be returned to the heart ; for on its unceasing circulation our health depends.

In order to effect this purpose, another set of pipes is prepared : these pipes are the veins, which joining the extremities of the arteries, receive the blood from them, and carry it back again to the heart."

"I should think" said Harry, "that this change in the current of the blood would cause a very odd sensation in our fingers and toes ; but I never feel it."

"I told you," replied his father, "that though the arteries are at first of considerable size, yet they branch out into smaller and smaller pipes, as they approach the extremities , therefore, the blood is continually dividing into a greater number of channels. Before they join the veins, these streams become so minute, that it is easy to suppose they may change their course imperceptibly. The veins, were you to look at a drawing of them, present the same appearance of branches, infinitely divided ; but as it is the office of the arteries to *distribute* the blood, so it is that of the veins to *collect* it. Through them it flows back to the heart, in a manner just the reverse of that in which it sets out : the minute veins unite in larger branches, the larger branches unite in still larger trunks, till the collected blood is at length poured into the heart, through one opening."

"Well then, papa, if the arteries resemble the water-pipes at London, I think the veins may be

compared to a river, which at first collects the waters of many little brooks ; as it flows on it is joined by larger streams ; its channel grows wider and deeper, till at last it empties its whole tide through one mouth into the sea."

"Excellent, my little philosopher ! you could not have found a better comparison than that. Before we dismiss the subject, I will point out two differences in the systems of arteries and veins, so admirably adapted to the functions each has to execute, as to afford a striking proof of contrivance. The blood, in going out from the heart, through the arteries, is continually passing from wide tubes into those which are narrower. In coming back, it passes from narrow vessels into wider : consequently, the blood presses the sides of the arteries with greater force than it acts against the coats of the veins. To prevent any danger from this difference of pressure, the arteries are formed of much tougher and stronger materials than the veins. This is one difference ; the other is still more striking, and shows more clearly the care of the Artificer. As an injury or wound in the arteries, through which the blood passes with such force from the heart, would be more dangerous than an injury in the veins, the arteries are defended from the probability of such accidents, not only by the strength of their texture, but their sheltered situation. They are deeply buried among the muscles, or they creep along grooves made for them in the bones. The under side of the ribs is sloped and

furrowed, to allow these important tubes to pass along in safety ; and in the fingers, which are liable to so many casualties, the bones are hollowed out on the inside like a scoop. Along this channel the artery runs in such security, that you might cut your finger across to the bone, without doing it any injury”

“I am sure” said Harry, “that is a great proof of care, where care was very much wanted ; for you must allow, papa, that people *are* apt to cut their fingers.”

“Much more so than to dislocate their shoulders, I grant, Harry. But the care of the Artificer is not greater than the importance of these vessels requires. It has often been said of persons who venture their lives in a ship, that there is only an inch-board between them and death ; but in our bodies, especially in the arterial system, there is, in many parts, only a membrane, a skin, a thread. The arteries are, therefore, deeply seated ; while the veins, which may be wounded with much less danger, lie above the arteries, come nearer to the surface, and are more exposed. Here is a proof of care and contrivance, that cannot be disputed or denied.”

“You have made it very plain to me, papa : I quite understand what you have said about veins and arteries.”

“Well then,” replied his father, “I will endeavour to give you some notion of the engine that works this curious machinery ; that is, the *heart*.”

“I can feel mine beating, and I have often seen

the hearts of different animals. We had a calf's heart for dinner yesterday."

"Then you probably observed that the heart is not a solid lump of flesh, but contains several cavities."

"I perfectly remember the appearance of the slice I had. There was a layer of flesh on the outside, and the hollow within was full of stuffing."

"Very well," replied Mr. Beaufoy: "it is on this *hollowness* of structure that the action of the heart depends. Like other muscles, it has the power of contracting; and when it contracts, the sides of its cavities are squeezed together, so as to press out any fluid the heart may at that moment contain. This purpose being effected, the fibres relax, the heart once more becomes hollow, and, as it dilates, the blood pours into the cavities from the large vein which brings it back to the heart. The next contraction forces the blood into the arteries; the quantity thus impelled being always equal to that which has just been received. And thus this wonderful organ goes on alternately contracting and dilating itself *four thousand* times in an hour! Month after month, year after year, it goes on without weariness or interruption, conveying renewed strength to every part of the body."

"I am sure I wonder that the heart is not tired: it seems to work harder than any thing else."

"Only think what this engine has to perform

in large animals! The opening through which the blood rushes from the heart into the arteries of a whale, is larger than the main pipe of the New River water-works at London; and the water roaring in that pipe, passes through it with less force and swiftness than the blood gushes from the whale's heart, which throws out ten or fifteen gallons of blood at every contraction, through a tube of a foot diameter!"

"That is astonishing, indeed!" said Harry; "but I think it is more curious to see the same operation going on in the arteries of a tadpole. How very small its little heart must be; yet it performs its work as well as that of the whale."

"Certainly," replied his father; "and the skill of the Artist is equally admirable in both cases, because exactly adapted to the end in view. Some persons will be more struck by the grandeur of vast designs, others by the perfection of minute objects. But do you understand the account I have given you of the heart?"

"Not quite, papa: since the contraction of the heart squeezes the blood into the arteries, I do not see why, when it dilates again, the blood should not run back into the hollow."

"I have shown you the construction of a pump, and how, by the alternate opening and shutting of the valves, the water is enabled to rise, and prevented from running back again."

"Oh, yes! I remember those little doors, or *valves*, as you called them, in the pump; but has the heart any contrivance of that kind?"

“Yes ; the heart can no more work without valves than the pump can. To prevent the inconvenience you have mentioned, valves are placed at the mouth of each of the great arteries which receive the blood from the heart. These valves, like flood-gates, leave the passage free while the stream flows forward, but close it whenever the blood, in consequence of the dilation of the heart, would attempt to run back. Can any contrivance be more strictly mechanical ?”

“No, papa : and I see very plainly that after all, we must be content to call ourselves machines.”

“And no disgrace to us either,” replied his father : “surely we have abundant reason for gratitude, when we see our health and safety the objects of such minute and anxious care ! The heart, on the unceasing action of which so much depends, has been guarded with peculiar solicitude : it is not only placed within the shelter of the ribs, and defended by their bony arch from external injury ; but it is enclosed in a tough, strong bag, which sits loosely and easily about it, guarding its substance without confining its motion, and containing a small quantity of water, just sufficient to keep the surface of the heart continually moist and supple. This bag answers no other purpose, and strikingly shows the care that has been taken of an organ so important.”

“I had not the smallest idea of this care, papa ; and I wish I could know more about the circulation of the blood, it is so very curious.”

"The account I have just given you," said Mr. Beaufoy, "is true so far as it goes, but it is imperfect. I have taken no notice of another important office which the heart has to perform; an office absolutely essential to the preservation of life."

"Is there more work still for the heart?" exclaimed Harry, with surprise: "I think what you have already told me is astonishing."

"So it is; but something yet remains to be effected. It is requisite for the blood to be continually brought into such a situation, as to receive, from the air, some quality or principle which is necessary to the support of animal life. This important office is also intrusted to the heart."

"How can that be, papa? Shut up, as it is, in the middle of the body, and secured in a tough bag that will hold water, how can the heart have any communication with the air?"

"By means of the lungs; but as the lungs are themselves enclosed in the cavity of the chest, perhaps you may like to know how the air enters them. I dare say you perfectly recollect the uncomfortable sensation arising from a crumb, or a small quantity of drink, *going the wrong way*."

"Yes, I know that miserable feeling very well, and how it makes one cough; but I do not understand the reason of such a disturbance."

"You must know, then, that two pipes go down our throats; one called the gullet, is intended to convey the food into the stomach; the other,

called the windpipe, is the passage for the breath and voice : it passes directly into the lungs, and supplies them with air. In order to prevent the unpleasant accident we were speaking of, the top of the wind pipe is covered with a little flap, exactly fitted to the opening. When we eat and drink quietly, all goes on well : the flap remains shut while the food passes over it, and then rises a little, to allow the air to pass into the lungs ; but if we laugh or talk while we are eating, we lift up this little protecting flap when it ought to be shut, and if the smallest particle of food enters the windpipe, we suffer that terrible irritation which is necessary to force the offending substance back again."

"I know that mamma is displeased when we speak with any thing in our mouths, and now I see she has more reasons than one for objecting to it ; it is dangerous as well as awkward."

"This is one of the many instances which prove the safety and advantage of early obedience. If your mother had not insisted on your curing yourself of the habit of speaking with your mouth full, you might have been choked, long before it would have been possible to make you understand the construction of the windpipe. I could tell you some other uses of that organ, but, at present, we will speak of it only as the means of supplying the lungs with air. When it has nearly reached them, the windpipe divides into two branches ; one of these goes to the right lung, the other to the left : each of them separating into

an almost infinite number of ramifications, which terminate in little cells that communicate with each other. The substance of the lungs is so filled with these air-vessels, that they appear something like the inside of a honeycomb. Now, in order that the blood may receive the necessary supply from the air, a distinct system of veins and arteries is contrived for that particular purpose. These are distributed through the lungs, and are so arranged that the air-vessels lie between the arteries and the veins. I will endeavour to make you understand how the heart carries on the double circulation I have mentioned.

“If this wonderful organ had only to receive the blood from the general system of veins, and force it into the arteries, *two* cavities would have been sufficient, one to receive the blood; the other to force it out again; but we find that the heart is furnished with *two receiving* and *two forcing* cavities, and for this reason: when the heart has received the accustomed portion of blood from the veins, it is necessary for *that* blood to pay a visit to the lungs, *before* it is returned into the arteries of the body. The next contraction of the heart, therefore, forces this portion of blood into the artery leading to the lungs. When it has there received the necessary supply from the air-vessels, it enters the small veins distributed among the air-cells: these veins unite in one large vein, which carries the blood back again to the heart; *now* properly prepared for entering, at the next

contraction, that system of arteries which is distributed through the whole body. Do you clearly understand me?"

"Yes, papa; and I do not think this double circulation makes the heart work any harder; for one dilatation might receive the blood from both veins, and one contraction might squeeze it into both arteries. This is very ingenious: but I should like to understand *why* it is necessary for the air to mix with our blood."

"I believe," replied Mr. Beaufoy, "that the reason of this necessity is not distinctly understood: it is sufficient for us to know, that in the constitution of most animals such a necessity exists. When a man falls into the water, and is drowned, he dies for want of air, which is prevented by the water from passing into the lungs. Should he be taken out before too long a time has elapsed, he may, though entirely senseless, and apparently dead, be restored to life by the use of proper means. Among these means, one of the most to be depended upon is forcibly blowing into the mouth and nostrils: by thus filling the lungs with air, the action of breathing has frequently been restored—the heart has resumed its office—the blood has once more been propelled through every part of the frame; and many, who appeared quite dead, have thus been restored to their friends."

"How rejoiced and astonished they must be!" exclaimed Harry: "but," added he, "it seems as

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if the motion of the heart itself depends upon the lungs being supplied with air."

"We have the highest authority for believing that this is the case," replied his father: "fetch me the Bible, and I will show you one of the most striking passages in the history of man."

Harry now read the account of the creation of man, in the second chapter of Genesis. "Nothing can be shorter than this," said his father; "but so far as the history goes, it is distinct and intelligible. When the body of Adam was completely formed, it appears to have remained lifeless and motionless: *then the Creator breathed into his nostrils the breath of life, and man became a living soul.* All that curious machinery, which had been prepared with such wonderful art, was at once put into action, and Adam became a living, moving, intelligent being."

"It must have been wonderful, indeed," said Harry, "to see the image, which a little before had been *the dust of the ground*, get up and walk, and speak, and be a perfect, living man: but there are many astonishing things related in the Bible, that do not happen now."

"It is true," replied Mr. Beaufoy, "that the descendants of Adam pass through the helpless period of infancy, and gradually acquire the use of their bodily and mental powers; but, in the first moment of existence, they, like him, receive this *breath of life*, this vital principle, which, so long as it continues to act, animates and sustains their wonderful organization. When it ceases—

when man *expires*, without being permitted again to inhale this necessary supply—*then*, when *his breath goeth forth, he returneth to his earth: in that very day his thoughts perish*. And here we might, from outward appearances, suppose the history of man was at an end, did we not know, from unquestionable authority, that this life is not to be the whole of his being.”

The action of breathing, and its connexion with the circulation of the blood, seemed more wonderful to Harry than any thing he had yet heard respecting the animal economy, and he endeavoured, the next morning, to draw his father into a renewal of the conversation ; but Mr. Beaufoy was going out, and could not spare time to talk to him.

“Your horse is not brought to the door yet, papa.”

“Well, then since you are so curious respecting this affair of circulation, come here and feel my pulse!”

“Oh, papa,” said Harry, laughing, “what can a boy like me know about pulses!”

“Come and try,” said Mr. Beaufoy. Then placing Harry’s fingers on the artery of his own left wrist, he asked him if he could feel the pulsation?”

“Yes : there it goes, jump, jump. Am I to count it?”

“No : that is not of any consequence. I wish you to consider, if the circulation of the blood is

so mechanical as I have described it, what would be the consequence of preventing it from flowing down my arm into this artery?"

"If the jumping I feel is caused by the blood pressing against the artery, it ought to stop when the blood is prevented from coming down."

"Then keep your fingers steady, and tell me what happens." While Mr. Beaufoy was speaking, he put his right hand into the top of his coat-sleeve, and made a strong pressure against the artery. "How does the pulse beat now, Harry?"

"Not at all, papa: it is perfectly still."

"Mr. Beaufoy removed the pressure, and again the pulse rose beneath Harry's fingers. The blood *must* come down from above, papa."

"Certainly: now we have tried an experiment upon an artery, I find your mother has sent for the surgeon to bleed her: if she will allow you to be present at the operation, you may have an opportunity of witnessing an experiment upon a vein."

"I have no doubt she will let me stay, if I tell her that you desired me to ask; but now I must run and fetch your whip, for here is the horse."

"Have you any objection to my being in the room, mamma?" said Harry: "I should like to see an experiment upon a vein?"

"Not the least, provided you make your observations in silence. I shall be very willing to answer any inquiries afterwards; but, you know, it would be unreasonable to trouble Mr. Sound

with a little boy's questions, since he cannot be supposed to feel any particular interest in your improvement."

Almost as soon as Mrs. Beaufoy had done speaking, the surgeon was announced ; and Harry, silently taking his station beside his mother's chair, resolved to fulfil his part of the compact.

When the bright lancet approached the arm, his eyes were involuntarily averted ; but he recovered himself in a moment, and beheld the blood flow with commendable philosophy.

When the surgeon thought the quantity taken was sufficient, he pressed his thumb upon Mrs. Beaufoy's arm, about an inch *below* the orifice ; and the blood which before was flowing in a full stream, instantly stopped. Many boys would have failed to observe this ; but Harry thought it the most curious part of the whole operation.


The arm was soon bound up, the surgeon took his leave ; and Mrs. Beaufoy, lying down on the sofa, desired Harry to come and sit beside her. " Well, my dear," said she, " did you clearly understand this experiment on a vein ?"

" Not quite, mamma. I do not know why Mr. Sound tied that ugly red bandage round the upper part of your arm : it was so tight that it must have hurt you."

" It certainly caused an unpleasant sensation ; but it was necessary, in order to prevent the blood in the arm from returning to the heart. You saw that Mr. Sound did not attempt to make the incision, till the vein, having received a quantity of

blood from the arteries, appeared full and prominent : it would not have filled in that manner, if the bandage had not prevented the escape of the blood. But did you observe how he stopped the bleeding ?”

“Yes, mamma ; to be sure I did. It was the very reverse of papa’s experiment on the artery : that was stopped by pressure *above*, the vein by pressure *below* ; and this is a real proof that the blood runs in opposite directions through the veins and arteries : nothing could be plainer ; and I only wish that I could see the action of the heart and its valves !”

“Now I feel very differently,” replied his mother. “I regard the concealment of our internal organization, as one of the benevolent arrangements of Providence. Were it possible to view, through the skin, the whole of this complicated mechanism, the sight would completely frighten us. How should we dare to move, or stir a step, if we actually *saw* the heart pumping, the blood circulating, the lungs blowing, the tendons pulling, and all the intricate assemblage of fibres, tubes, valves, currents, pivots, and hinges, that sustain our frail existence ! It is kindly and  ordered that these things should be hidden from our view.”

“But how *very* curious the sight would be : I cannot imagine any thing to equal it.”

“It could not be presented to us without engaging our whole attention ; and if these motions in any degree depended upon ourselves, they

would leave us leisure for nothing else. Now, in a state of health, the vital functions are carried on insensibly, though they depend on the nice adjustment of so great a number of parts; and these must all be going right, for us to enjoy an hour of ease. It is surprising what great inconvenience is sometimes occasioned by the disorder of a very small part of this mechanism. I have read of a gentleman, who in other respects enjoyed pretty good health; but he had lost the power of using those two little muscles which lift up the eye-lids. Only think what a misfortune: whenever he wanted to look at any thing, he was obliged to push up his eye-lids with his fingers!"

"I am sure, poor gentleman, he was exceedingly to be pitied!"

"And so should we, Harry, if we were in any way concerned in these operations. We should be continually on the watch—continually in fear that something would go wrong or be forgotten. We cannot, therefore, be too grateful to *Him in whom we live, and move, and have our being*, for that nice arrangement—that perfection of contrivance, which keeps every part of the human machine in action, without a thought or care of ours; leaving us at liberty to enjoy the blessings and perform the duties of life."

CHAPTER IV.

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"Whether with reason or with instinct blest,  
 Know, all enjoy that pow'r which suits them best ;  
 To bliss alike by that direction tend,  
 And find the means proportion'd to the end."

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ONE morning, Harry prevailed on his mother to carry her work to the summer-house, where he read to her "The Transmigrations of Indur." "Is not this an entertaining story, mamma?" said he, as he laid down the book. "Yes, my dear ; and I think it is ingenious as well as entertaining. Do you not admire the skill with which the writer has introduced so many curious particulars, respecting the habits of different animals?" "Oh yes, mamma. I know that whether Indur was an antelope, or a dormouse, or an elephant, he behaved like other creatures of the same kind—just as we find them described in books of natural history."

As Harry finished speaking, his attention was attracted by the humming of a bee, that was busily employed among the roses and honeysuckles, which were trained round the window. "Only look at this bee," said he : "look, mamma, how earnestly it works ! Indur, with all his knowledge, could not have been more sensible of the importance of laying up a store for the winter."

“ You are mistaken, Harry. This industrious little creature is not endued with prudence and foresight ; for these are qualities belonging to rational beings : they are the result of experience and instruction. Now the actions of animals which are not endued with reason, are referred to a feeling called *instinct* ; a feeling which is independent of experience and instruction ; and which does not prompt the animal to action in order to secure a future benefit, or to avoid a future evil, but simply to gratify a present inclination.”

“ It does not seem so to me, mamma ; and I think the bee would enjoy this fine sun-shiny morning much more, if it fluttered about like the butterflies yonder, than it can do, staying so long with its head and shoulders buried among the petals of a flower, where it can see nothing. I think it is much wiser than the butterfly, because it prefers a future good to a present pleasure.”

“ You are mistaken, my dear boy. The industrious bee and the giddy butterfly are equally intent upon their present gratification, and equally regardless of future consequences.”

“ Oh, mamma, how can you think so ! When the flowers and sunshine are over, the foolish butterfly will perish miserably, while the bee will lie snugly in its well-stored hive, till spring produces fresh flowers.”

“ Yet there is neither wisdom in the bee, nor folly in the butterfly : both are equally pursuing the end of their being, and each finds its proper and present gratification in the habits which are suited to its respective modes of life. The but-

terfly is not intended to live through the winter, why then should it lay up a store of food? And though the industry of the bee is applied to so necessary and rational a purpose, the contrivance, *the forethought*, is not in the insect, but in its benevolent Creator, whose tender care is extended to the meanest of his works."

"But the bee gathers the honey, and builds the cells to receive it, and enjoys the benefit of it afterwards, as much as the farmer profits by the corn he stores up in his barn. Why may we not suppose it to have the same motive?"

"It is true that the art and will of the bee appear to be concerned in these employments; but they would be carried on to no purpose, were it not for one operation in which its own will can have no concern."

"What operation do you mean, mamma? I can see nothing done by the bee, that a prudent, industrious creature might not perform."

"You have seen bees at work in a glass hive, Harry, and you have admired the regular distribution and exact proportion of the curious little cells in which they deposit the honey; but did you ever reflect, that the honey could be of no use to the bee, as a winter store, if it were not for the wax? These two substances would be of little service to it separately, though, together, they are sufficient for the supply of its wants. You know that the bee finds honey in the nectaries of flowers, but I believe you are not aware that it *makes* the wax."

"Oh no, mamma. I thought that both wax and honey were obtained from flowers; and I have seen the little spoons that grow on the thighs of the bees, on purpose to collect it. Papa showed them to me in his microscope."

"Those spoon-shaped appendages," replied Mrs Beaufoy, "enable the bee to collect the farina of flowers. It has generally been imagined, that this farina is converted into wax by a digestive process in the body of the insect; but Mr. Hunter, who was a very attentive observer of the economy of bees, is of opinion that wax is a kind of oil, formed between each of the scales which cover the under side of the bee's body. At first sight this secretion causes the lower edge of the scales to appear double, but, on examination, the substance in question is found to be loose. Mr. Hunter took several of these tiny flakes, or scales, on the point of a needle, and held them to a candle, where they melted, and immediately formed themselves into a round globe, which he believed to be wax. He was confirmed in his opinion, by observing that these little flakes are to be seen on the bodies of bees, only at that time of year in which they are building their cells."

"What an easy experiment!" exclaimed Harry; "I could try it myself: but I cannot see the little waxen scales, unless I catch a bee and confine it."

"Yes, you may see them as Mr. Hunter did, by watching the bees while they are climbing up the inside of the glass hive."

"That I can easily do, whenever I go to my uncle's. Thank you mamma, for telling me this! But I wish to know another thing: If the farina is neither honey nor wax, what is it? and why do the bees collect it?"

"You may suppose," replied his mother, "that the farina is of great consequence to the bees, since they are furnished with organs for the express purpose of collecting it. They take great care of the farina, and deposit it in cells, as they do the honey, kneading and working it into a kind of paste, which is called bee-bread. This substance is intended for the support of the young while in the maggot state: the bees do not eat it themselves."

"How can that be known, mamma? If the bees take such pains to collect it, and preserve it in cells, why do you think they do not eat it with their honey?"

"It sometimes happens that bees are not able, during the summer, to collect a sufficient quantity of honey to last them through the winter. In this case they die of hunger; but it has been found, on examination of the hive, that, though all the honey was consumed, the bee-bread, which had been laid up in store for the maggots that were to be hatched the following spring, remained untouched."

Harry thought it very strange that any creature should endure the pain of hunger, when food was close at hand. "If they thought it good enough for their young, surely they might be content with

it for a little while," said he : " at any rate it would be better than starving."

" Why, to be sure, you and I would live upon bread and milk, in a case of such necessity," said Mrs. Beaufoy, smiling ; " but animals cannot accommodate themselves to change of food, with the same facility as man. The exactness with which their digestive powers are suited to their appropriate food, is as wonderful as the instinct which impels them to choose the kind that will nourish them, and strikingly proves the existence of design in the Creator."

Harry did not yet understand the question, and he remained unconvinced : he therefore replied : " They had better be badly nourished, than quite starved : any food must be better than no food at all."

" Life, my dear Harry, cannot be supported by the mere act of swallowing food : it must undergo that change in the stomach which we call digestion, before any creature can be nourished by it. In order to effect this change, the stomach is supplied with a liquor called the *gastric juice*, which dissolves the food, and prepares it for being finally converted into blood. Now, if you were to confine an owl in a cage, and feed it as you do your canary, the poor thing must starve, because the gastric juice of the owl's stomach is incapable of dissolving seed, or any kind of grain. The same misfortune would happen to the farmer's sheep and oxen, if, when he was short of fodder, he attempted to keep them on animal food. Thus,

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you see, the bees might have eaten the bee-bread, and still have died of hunger."

"Thank you, mamma: I understand it now. But what curious distinctions! I should like to know more about the gastric juice, and how it is that *we* can digest both meat and vegetables."

"That would lead us into too long a discussion. But one thing is evident—that man was intended to inhabit every climate to accommodate himself to circumstances, and to surmount difficulties by the exercise of his reason. He could not have done this, had his stomach been so constituted as to digest only some particular kinds of food; but he enjoys health and happiness, whether he inhabits the frozen solitudes of Baffin's Bay, or the burning sands of Africa."

"I am very glad of it," said Harry; "for I am sure there is a great deal of pleasure in surmounting difficulties, and being able to live in all countries: especially in learning so many curious particulars about ourselves, and the poor animals that are forced to starve when they cannot obtain their own proper food. We are much happier than they."

"All creatures enjoy the kind of happiness best suited to them. Bees are very happy insects. In the depth of winter their hives are as warm as our rooms in a fine summer's day; and they generally lay up plenty of food for themselves and their young."

"Are you sure that the young actually eat

that farina ;—that bee-bread, I think you called it ?”

“ These things can be known only by experiment. The stomachs of some bee-maggots, when carefully examined, appeared full of a substance resembling bee-bread, but never contained honey. I believe this is coming as near to a proof of the fact, as the case admits.”

“ Nothing can be nearer,” replied Harry, “ except seeing the maggots eat it.”

“ You have often,” continued Mrs. Beaufoy, “ admired the exact proportion of the little waxen cells which compose the honeycomb, without being aware that the diminutive size of those cells is a matter of any consequence ; but I dare say you recollect my showing you a jar of honey that had stood some time in the parlour closet.”

“ Perfectly, mamma : the honey had fermented, and it was quite spoiled. I recollect you said, that in future you would keep honey in a colder place.”

“ A bee-hive is much warmer than that closet, and consequently the honey would be rendered unfit for use, if this tendency to fermentation were not prevented, by distributing it into very small cells. But the bee, which has never seen a large mass of honey collected in one vessel, cannot *intend* to prevent this inconvenience. What account can we give of these facts, Harry ? The bee is evidently designed to feed upon the produce of flowers : it requires a store of honey for itself, and farina for its young, when flowers

are not to be found : it is furnished with organs to collect both these substances ; the proper material for building its store-house is supplied by secretion from its own body ; and, lastly, it uniformly makes its cells of such a size as to preserve the honey from fermentation. This is a just account of honey and the honeycomb, and I think you cannot help perceiving, in every part of it, marks of knowledge and contrivance, far above the powers of the bee."

"That is very true, mamma : yet it seems strange that the Creator should take so much thought and care about a little insignificant insect."

"You remember the words of our Saviour, Harry :—*Are not five sparrows sold for a farthing ? Yet not one of them is forgotten before God.* This is not one of the hyperbolic expressions common in eastern nations, but the plain, literal truth ; and a truth full of consolation to us, who cannot but feel how little and insignificant we are, compared with the grandeur and immensity of our Creator's works. But we need not fear being forgotten by him : we are *much better than the fowls*, much nobler than *the lilies of the field*. We cannot distrust his providential care, while we observe the proofs of benevolent superintendence which every where surround us. Look yonder at the white butterflies fluttering over that bed of cabbages. They appear wholly intent on amusing themselves ; they are, in fact, desiring nothing, seeking nothing, but their own gratifica-

tion; yet they are unconsciously obeying the direction of that invisible power which is watching over them. Can you think of any reason for their preference of that particular part of the garden which is planted with cabbages and cauliflowers?"

"No: indeed, I wonder that they do not amuse themselves in the flower-border. But perhaps they eat some part of the cabbage."

"The butterfly does not taste the cabbage; it is no food for her: but she is acting under a wise direction, which impels her to lay her eggs on the leaves of such plants as are best adapted to the nourishment of the young caterpillars, which, in a few days, will issue from those eggs. She does this studiously, and from choice, though she knows not *why* she prefers these plants."

"How can you tell that she is so ignorant, mamma?"

"Because knowledge is obtained either by experience or instruction. Now the butterfly cannot eat the cabbage herself; and when she was in the state of a caterpillar, she had no teacher to inform her of her origin. She never knew her parent, and therefore she cannot be acting from imitation. She merely gratifies a desire, awakened by the Author of her being for a benevolent purpose, and which, at the same time, is a source of pleasure to herself."

"But perhaps she remembers the time when she was a caterpillar, and liked to eat cabbage."

"I am afraid that '*perhaps*' will not remove

the difficulty. As the butterfly, in her caterpillar state, had no one to instruct her, 'how could she tell that she herself proceeded from the egg of a winged insect, or that the egg which she deposits on the cabbage-leaf will ever become a living creature ; not a creature like herself, but like the caterpillar which you suppose it possible she may remember herself once to have been ? And we must recollect that it is not here and there an insect that appears capable of this, but that all butterflies of the same species uniformly act in the same manner. But you need not depend on my account of these things, Harry : make use of those powers of reasoning and observation which a bountiful Creator has bestowed upon you, in order to lead you to the knowledge of that power and goodness, which are every where surrounding us with evident proofs of his providential care."

"I like to see those proofs, mamma, and I understand these things when you are so good as to explain them to me ; but I am afraid I shall never learn how to find them out by myself."

"Nothing can be simpler and easier ; only be careful to examine what you see, and then endeavour to account for such appearances. Go now to the cabbages, and look on the *under* side of the leaves. I think you will find some eggs attached to them : if you do, bring a leaf to me."

Harry departed on his mission, and soon found the object of his search ; but, as he was returning with it to his mother, his attention was ex-

cited by a butterfly of far greater beauty than those he had left among the cabbages. It alighted on a flower, and he stopped to examine it. The wings of this insect were red, with a margin of black varied by blue spots : its upper wings were also distinguished by alternate bands of black and pale orange : beneath these bands were three black spots, and the upper part of the wings was also ornamented with a stripe of white. Delighted with the beauty and variety of its colours, Harry thought he would carry the butterfly to his mother. Cautiously advancing his hand, he seized it dexterously, at the moment when it had closed its wings, and ran away as fast as he could.

"Here, mamma," cried he, "here is a butterfly worth twenty white ones. Only look what a beautiful creature ! I will run and fetch a tumbler to put over it, and then you can see it better."

"There is no occasion to take that trouble, my dear. Your prisoner, though one of the most beautiful, is also one of the commonest species of British butterflies. Let it go, poor thing : we have no good reason for depriving it of its liberty."

Harry immediately set his prize on one of the honey-suckles near him. The beautiful insect closed and unclosed its wings, as if to assure itself of being again at liberty, and then flew away. Harry's eyes pursued its flight till he could see it no longer. "I am glad I did not hurt it ?" said

he: "its life will be very short, and it would be a pity to lessen its pleasures."

"A humane person never likes to inflict unnecessary pain," replied his mother: "on the contrary, he rejoices in beholding the happiness of all animated beings. Dr. Paley, when walking by the sea-side, in a calm evening, while the ebbing tide was leaving the sands, frequently remarked a very thick mist or cloud hanging over the edge of the water. This cloud appeared about half a yard in height, and two or three yards broad: it stretched along the coast as far as he could see, and he observed that it always retreated with the water. Curiosity led him to examine it; and he found, that what at a distance appeared like a cloud, was in reality a multitude of young shrimps, which were amusing themselves by bounding into the air, from the shallow margin of the water, or from the wet sand."

"I think he must have been disappointed, when his wonderful cloud proved to be only an assemblage of little, insignificant shrimps."

"By no means, Harry. They were not insignificant to him. To his benevolent mind each little shrimp appeared to be, what it was in reality, the favoured creature of a bountiful God; blessed with life, and health, and activity, and enjoying the full exercise of its powers. When his eye pursued the living cloud, that stretched along the windings of the shore; when he thought of the countless myriads of happy little beings of

which it consisted ; his mind turned with feelings of reverence and gratitude to that merciful Providence, which is every where present,—every where bestowing not only life, but the capacity of enjoying it. Tell me, Harry, whether you think it possible that such reflections as these could pass through the mind of Dr. Paley, without sensibly increasing his own happiness ?”

“ Certainly not, mamma ; and if such thoughts come into any person’s mind very often, it must help to make him kind and good. When I caught that butterfly, I wished to keep it under a tumbler, for the pleasure of admiring it ; but I am glad you desired me to let it go : I should be vexed with myself now if I had teased it. Poor thing, the cold weather will kill it before long !”

“ Perhaps not,” said Mrs. Beaufoy : “ it is one of the second brood of that species which has been produced this summer : it may possibly shelter itself in some favourable situation, and remain alive till the return of spring. I remember finding such a butterfly among a heap of stones, in the next field, soon after Christmas : it was alive, though in a torpid state. But your tortoise-shell butterfly has made us forget the white ones. I see you have brought a cabbage-leaf : are there any eggs upon it ?”

“ Yes, plenty, mamma ; but it is well you told me to look on the *under* side of the leaves, or I should not have found them. How could you tell that these butterflies were so cunning as to put their eggs out of sight ?”

"Creatures that are governed by instinct, act uniformly in the same manner as the rest of their species. I have already told you this: you should not therefore be deceived by the *appearance* of contrivance in the insect. Why, indeed, should the butterfly feel any anxiety about the fate of her egg? Why should she be solicitous to provide for the nourishment of the future caterpillar? That dear caterpillar she will never see: it can never be any thing to her. Surely, you do not suppose that she hides her egg from a patriotic care for the preservation of the race of butterflies."

"No, no, mamma," said Harry, laughing: "I do not suppose that; but the *appearance* of design in the insect is so like reality, that it puzzles me."

"That is only because the subject is new to you. When you are more accustomed to reflect upon it, you will perceive that we cannot account for these appearances without continually going back to the great First Cause, the original Contriver of all the wonderful machinery of nature. By this means, the idea of God will become connected with every other idea; and the influence of this constant and lively sense of the divine presence and power, attending to, disposing, and governing all things, must have a favourable effect upon our characters. It will be impossible for us to distrust that providential care which we see is continually exercised in behalf of the meanest creatures. Confidence in the goodness of the

Almighty must naturally produce resignation to his will ; and when once these dispositions are firmly settled in our minds, we shall have discovered the true secret of happiness."

"I did not think, when we began to talk about bees and butterflies," replied Harry, "that the actions of such little creatures could have any influence upon us or our feelings towards God ; but what you say respecting his providential care seems to connect us with every thing that lives."

"Very true, my dear ; and the more you reflect upon the subject, the more you will be astonished, not only at the greatness of the power which thus watches over all, but at the minute attention that is paid to the comfort and security of the most insignificant. For instance, your tortoiseshell butterfly would not deposit her eggs on a cabbage-leaf : she will select the stalk of a nettle for that purpose, because, though she knows it not, the future caterpillar is destined to feed on the leaves of that plant."

"How very curious ! I suppose that is the reason she flew over the wall, as soon as she was at liberty ; for we have no nettles here in the garden. There are plenty in the corner of the next field ; and, perhaps, if I were to go there, I might find my beautiful butterfly."

"Very probably. Those who collect butterflies, are so well aware of this fact, that if they wish to obtain a fine specimen of any particular kind, they do not wait till it has emerged from the chrysalis state, but take a caterpillar from the

plant on which they know that the parent fly deposits its eggs, and feed it on its appropriate food, till it ceases to eat, and changes to a chrysalis; they then suffer it to remain till the dry skin of the chrysalis falls off, when the winged insect appears, with its colours in full perfection, uninjured by weather or accident of any kind, and therefore particularly valuable to the naturalist."

"I believe I shall think nothing trifling in future, mamma. I will try to observe all that is going on around me. How many new ideas I have gained this morning, because I happened to see a bee settle upon a honeysuckle!"

When Mrs. Beaufoy and her son returned into the house, Harry was much surprised at finding a glass globe, containing some gold-fish, in the parlour-window. "Oh, mamma?" exclaimed he, "are these beautiful fish yours?"

"No, my dear: I have promised to take care of them for my old friend Mrs. S. who is going to leave home for a few weeks. She was afraid that her gold-fish might be neglected during her absence; and I more willingly complied with her request, because I thought her favourites would afford some amusement to you."

"Thank you, dear mamma: I shall like to watch them; for I never saw any fish near enough to observe their manner of swimming." So saying, Harry drew a chair to the window, and sat for some time, quietly observing the beautiful colours, and the pliant, easy motion of the little

animals before him. He had lately been in a boat with his father, who had taken that opportunity of showing him the use of the rudder, and he now perceived that the tail of a fish is to it, exactly what the rudder is to the boat. When the animal desired to turn, a single blow with its tail in the opposite direction, brought it round at once. "Mamma," exclaimed he, "I do believe that men learned how to steer a boat from watching the action of a fish's tail: only see, how exactly it answers the purpose of a rudder!"

Mrs. Beaufoy replied, by repeating those lines in which Pope so beautifully represents man as learning many arts from the instinct of animals.

- " See him from Nature rising slow to art!
 To copy Instinct then was Reason's part:
 Thus then to man the voice of Nature spake:—
 ' Go, from the creatures thy instruction take:
 Learn from the birds what food the thickets yield;
 Learn from the beasts the physic of the field;
 Thy arts of building from the bee receive;
 Learn of the mole to plough, the worm to weave;
 Learn of the little nautilus to sail,
 Spread the thin oar, and catch the driving gale.
 Here too all forms of social union find,
 And hence let reason, late, instruct mankind;
 Here subterranean works and cities see;
 There towns aerial on the waving tree.
 Learn each small people's genius, policies,
 • The ant's republic, and the realm of bees;
 How those in common all their wealth bestow,
 And anarchy without confusion know;
 And these for ever, tho' a monarch reign,
 Their separate cells and properties maintain.'"

H

"I like those verses very much," said Harry ; "but I think the *beaver* would have taught man 'the arts of building' better than the bee. A beaver-village is far more like a town than a beehive ; and I wish you would alter that line for me."

But before Mrs. Beaufoy could change the bee into a beaver, to her own and Harry's satisfaction, he begged she would look at one of the goldfish, which remained stationary at the bottom of the glass. "Why should that fish be heavier than its companions?" said he.

"We have no reason to think that it is heavier."

"What! not when it sinks to the bottom!" replied Harry, with much surprise. "I thought the very reason of any thing sinking, was its being too heavy to swim—heavier than the water, you know, mamma."

"I believe there is not much difference between the weight of fish, and the weight of an equal bulk of water ; for this reason they swim with very little effort. You see that a gentle motion of the tail and fins is sufficient to direct their course ; but as they are rather heavier than the water, they would naturally sink to the bottom, and remain grovelling there, if it were not for a mechanical contrivance which enables them to rise and sink at pleasure."

"What is that contrivance, mamma ? I should like to understand it."

"It is a bladder filled with air, which the fish

has the power of distending or contracting : when it is distended, the fish becomes lighter than the water, and rises ; when the bladder is contracted, the weight of the animal causes it to sink."

"Where is this bladder, mamma?" said Harry, going so close to the globe that he frightened its timid inhabitants.

"You cannot see it, my dear : it is within the body of the fish ; but the principle on which it acts is exactly the same as that of the air-balloon, by which you know that men can rise in a still lighter fluid."

"And boys can swim in water, by the help of bladders," said Harry.

"True," replied Mrs. Beaufoy ; "and they resemble our fish in another particular : 'their high-blown pride' sometimes 'breaks under them : ' this has also happened to fish, which were afterwards compelled to remain at the bottom of the water.

"Another proof that the air-bladder assists them in swimming, is found in the fact, that flounders, soles, and some other species which are not furnished with the bladder; seldom rise in the water ; and when they do, it is with effort."

"I pity those unfortunate fish : it must be so dismal to be always at the bottom of the sea."

"Your pity is misplaced, my dear Harry. The care of the Creator is seen where it is wanted. The fish I mentioned, which are destitute of the air-bladder, feed on small shell-fish ; and are therefore happier among the rocks and weeds at the

bottom of the sea, where their appropriate food is to be found.

“Whenever we examine the works of the Deity, we find (at least where we are capable of understanding the construction of them) that the bountiful goodness with which he bestows the means of enjoyment, is equalled by the wise economy which exactly proportions the gift to the wants of his creatures.

“Thus, for instance, in birds that feed upon fish, the middle claw of the heron, which wades into the water, is notched like a saw, and these notches assist it in holding its slippery prey ; but the solan goose, which darts down from the air upon the shoals of herrings, has the side of its bill irregularly jagged, to answer the same purpose. We cannot account for these peculiarities of form, so exactly suited to the habits of each, unless we ascribe them to the care of an intelligent Creator.”

“Then I suppose,” said Harry, “that equal care has been taken of land-birds.”

“Certainly : your chickens, for example, live upon hard corn, which they have no teeth to chew and which their stomachs are incapable of digesting till it has been broken in pieces.”

“But indeed, mamma, they swallow it whole : I have seen them do it a hundred times.”

“I know you have ; but it is equally true that a chicken would starve upon a heap of corn, if it were not for a peculiar muscle with which it is furnished. You have often seen the gizzard of a

fowl, Harry, but you did not know that it was endowed with the power of bruising and grinding the corn as effectually, and by the same mechanical action, as that of the mill which grinds the coffee-berries for our breakfast."

"This is very curious," said Harry: "then the gizzard of birds supplies their want of teeth."

"You travel too fast, Harry. All birds have not gizzards; the contrivance is only found where there is a necessity for it. Birds of prey have no occasion for such an organ; their food does not require to be ground in a mill. They have hooked beaks, and strong, sharp, crooked talons, fitted for seizing their prey, and tearing it to pieces. It would be easy to multiply these instances; for the same principle is uniformly acted upon by the Creator. Throughout the wonderful variety of animated beings which he has called into existence, we find the outward form, and the internal organs, to be exactly that which is best adapted to the habits and the comfort of each species. I do not, however, wish to give you any further proofs at present. If there were no other instances of intelligent contrivance in nature, than those I have mentioned, they would be sufficient, and more than sufficient, to prove to you that there could not be such evident marks of design, unless there were some power capable of inventing and executing these things."

"I know it," replied Harry: "the watch must have had a watchmaker."

H 2

“Yes, that was our first conclusion; and you see that it may be applied to greater things than a watch.”

CHAPTER V.

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 “Thro’ worlds unnumber’d tho’ the God be known,  
 ’Tis ours to trace him only in our own.”

POPE.

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ON Sunday evening Harry read the 19th Psalm to his parents, and afterwards accompanied them to the terrace in the garden, where they continued to walk, till long after the magnificent tints of the western horizon had faded into the obscurity of twilight. The eastern sky remained unbroken by a single cloud, and the full moon appeared slowly rising behind a distant wood. They stopped with one consent, and watched it gradually emerging, till it hung suspended, “like a lamp of gold,” over the dark tufted trees. “*The heavens indeed declare the glory of God!*” said Mr. Beaufoy, breaking silence. Harry pressed his mother’s arm with one hand, while with the other he pointed to the beautiful object of their attention. “I wonder, mamma,” said he “I wonder very much, why you never chose *that* for one of your proofs of his power and wisdom.”

“I think your mother acted very wisely in not

doing so," replied Mr. Beaufoy: "she wished to convince you, by the evidence of your senses, that there is an intelligent Creator. This can be done most effectually by observing such of his works as we have an opportunity of submitting to a close and accurate inspection. When we examine their construction, and find the different parts perfectly adapted to each other, or when we perceive that a threatening danger has been guarded against by an express precaution, the existence of design is so evident, that the most careless observer must be struck by it. If once we prove *design*, you know, Harry, we are sure that there must be a contriver."

"What you say is very true, papa; but I like to think of his *glory*," said Harry, whose eyes were still fixed upon the moon.

"I grant," resumed Mr. Beaufoy, "that when the understanding is convinced of the existence of the Creator, the contemplation of the heavenly bodies is calculated to raise our minds to sublimer views of the magnificence and immensity of his works. The mere image of the moon, presented to the eye of a child, cannot do this. You can perceive in it only a luminous circle; we have nothing with which we can compare it; no invention—no discovery—no operation of art that resembles it. Much reading and thinking will be necessary, before you can understand the laws which govern the motions of the heavenly bodies, and connect them with the systems to which they belong. Your mother might have told

you a great deal respecting these things, but you must have taken her word for it. The examples she has chosen were suited to your understanding, and evident to your senses. They also served another important purpose."

"What is that, papa?"

"They are calculated to give you a just idea of the *character* of this invisible and mysterious being. *The moon walking in brightness* may declare his glory, for he who created it must be glorious and powerful; but the curious and perfect organization of every creature that has life; the minute and tender care that has been shown to adapt its instincts to its wants, and to make existence a blessing; what does *this* prove, Harry?"

"That God is kind and good."

"And if to some of his creatures he has given an understanding capable of observing and reflecting upon these proofs of wisdom, power, and goodness, and of discovering that all the blessings they enjoy are his gift, what effect ought it to produce upon their minds?"

"I think they ought to be very grateful."

"And how do people show their gratitude?—you, for instance, when you feel grateful to your mother, or to me?"

"I try to obey you, papa, and to please you in every thing."

"But if you had never seen us, Harry, you would feel very much at a loss what to do in order to please us, even though you should every

day receive some proof of our love and care for you."

"That is very true, papa ; but how could I help it ?"

"You could not help it, my dear boy ; and such would be the unhappy condition of men, if they were left to the religion of nature. They could only *guess* what conduct would be acceptable to the Deity."

"Then, papa, it is not a good religion : people ought to be *quite sure*."

"There was an extraordinary man among the ancient Greeks, who was of the same opinion. By constantly meditating on the works of creation, he discovered that there must be a Being of infinite power, wisdom, and goodness, who desires the happiness of his creatures. Socrates, for that was the name of this philosopher, thought that the Divine Wisdom would be pleased with men who led a virtuous life, and he spent all his time in going about to admonish and reform his countrymen. Some of them profited by his instructions, but he found it impossible to convince others ; and he felt so much uncertainty on many subjects himself, that he acknowledged men could not become what they ought to be, until it should please the Deity to favour them with a more enlightened teacher. With what seriousness would Socrates have listened to that further revelation of himself, and his intentions respecting mankind, which the Almighty has since been pleased to impart!"

"You mean, papa, that Socrates would have been very glad to read the Bible!"

"I meant especially to refer to the *New Testament*; for though God spoke to the heathen philosopher in the works of creation, and instructed Moses to inform his chosen people how to obtain his favour, it was not till he spoke to all mankind by his Son, that we could be fully aware of his gracious intentions respecting us. Knowing that we are not capable of beholding him in his full glory, he has kindly drawn a veil over it, and, in the person of our Saviour, presented us with a perfect example of every virtue. He was encompassed with our infirmities, that he might teach us how to bear them; and submitted to death, that he might give eternal life to all who are willing to come to God through him."

"Let me advise you, my beloved child," said Mrs. Beaufoy, who had hitherto taken no part in the conversation, "to endeavour to understand the *conditions* on which this gift is offered. Do not be satisfied with adopting the opinions of others, but seek to know the truth for yourself. Your personal interest in this question is so great, that every other kind of knowledge is trifling, when compared with it. *What will it profit a man if he gain the whole world and lose his own soul?*"

Such were the lessons which the parents of Harry Beaufoy laboured to impress on his heart and understanding. May he one day become

their *joy and crown of rejoicing*; looking back with a grateful heart to the happy days of childish simplicity, when, under their guidance, he became the Pupil of Nature !”

THE END.

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